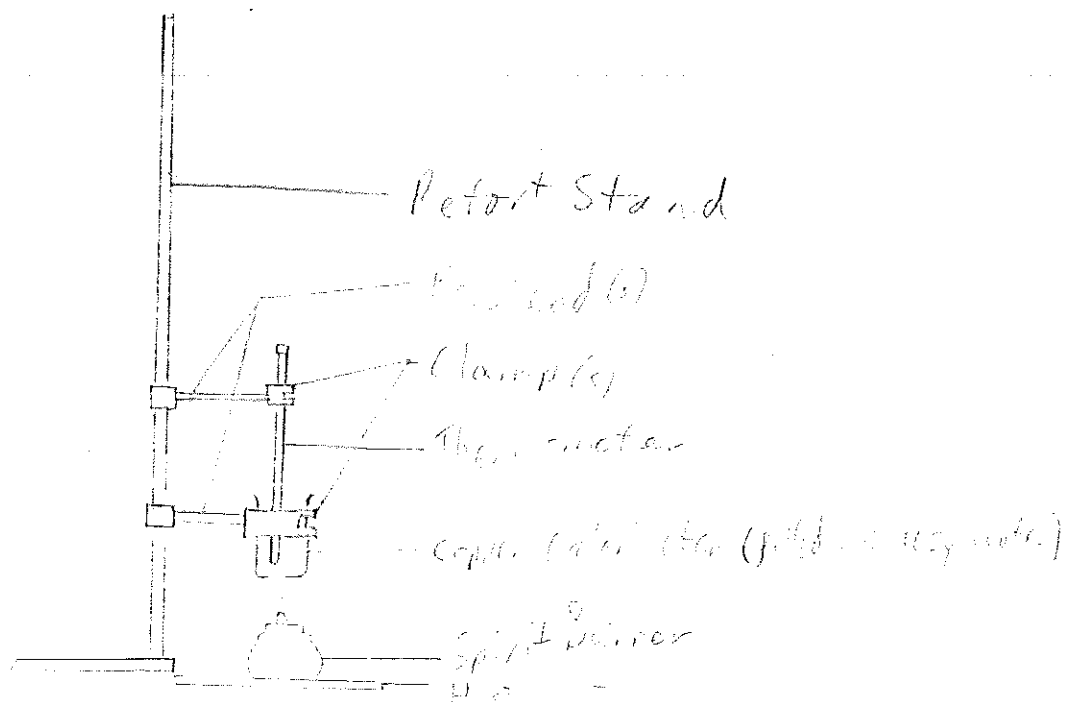
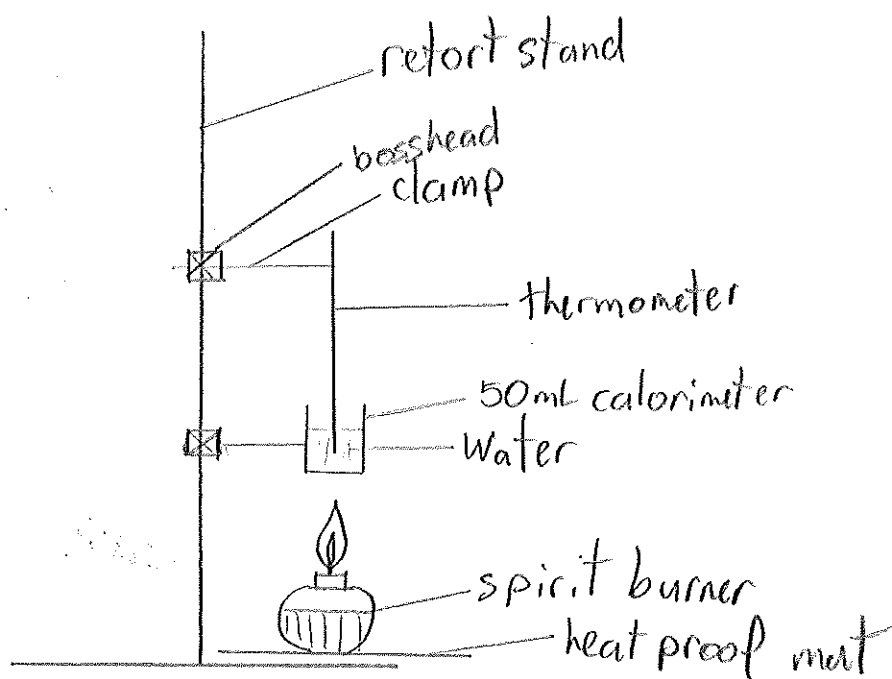


4. Suggest improvements to help reduce this error.

5. Draw a diagram of the experimental apparatus set up.



NO_x



VARIATION ...

... makes reliable data, they are problems associated with the validity and accuracy of the experiment. The experiment is not set up quite right as some systematic error has been made. The distance between the copper calorimeter and spirit burner should be consistently kept at 1-2 cm. The results are also not accurate based on the thermometer used which may have not given precise results. (e.g. by mistake should be couple centimeters but taken note is produced)

Accuracy ... systematic error ... Error ...

4. Suggest improvements to help reduce this error.

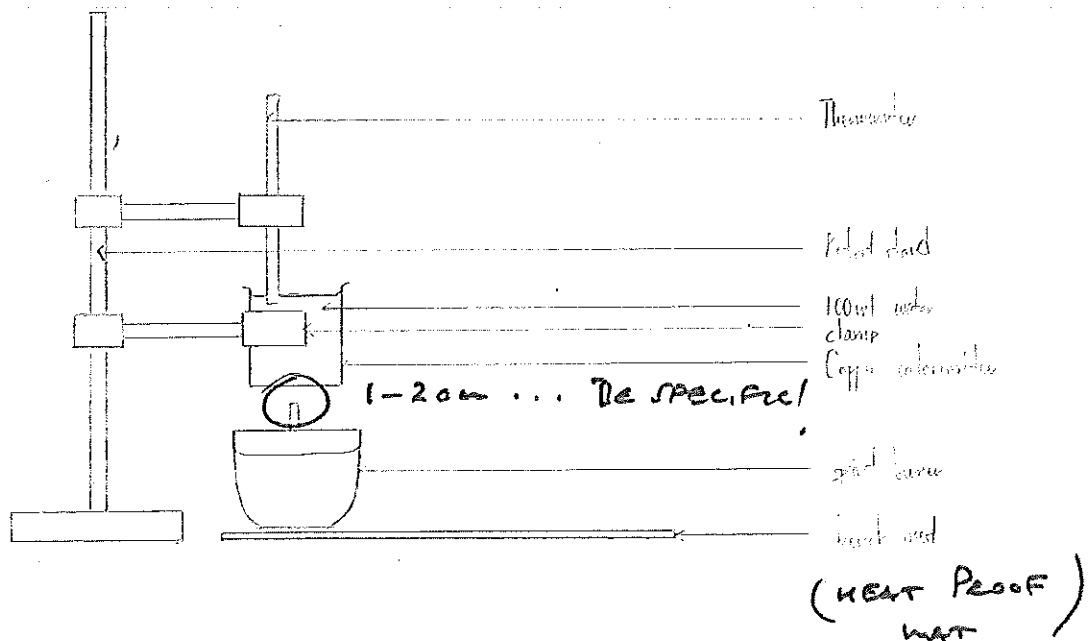
THINK HARDER ... !

... More trials or a repetition improves the reliability.
 ... distance of copper calorimeter and spirit burner should be kept consistently at 1-2 cm.
 ... Using a more precise measuring equipment such as data logger.

5. Draw a diagram of the experimental apparatus set up.

DIDN'T WE
DO THIS!!!

Diagram #1 Set up of experiment



Results

Present your results in table form in the space below.

Table 1: (Mass & Volume of different alloys and their densities)

Alloy	Temperature (°C)									Average
	Initial			Final			ΔT			
	1	2	3	1	2	3	1	2	3	
Aluminum	29.0	21.0	21.0	43.0	32.0	42.0	19.0	17.0	21.0	19.0
Iron	29.0	21.0	21.0	43.0	32.0	42.0	27.0	31.0	29.0	29.0
Copper	29.0	21.0	21.0	43.0	32.0	42.0	24.0	18.0	20.0	20.7

Table 2: (Mass & Volume of different alloys and their densities)

Alloy	Density (g/cm³)									Average
	Initial			Final			Δ(g)			
	1	2	3	1	2	3	1	2	3	
Aluminum	210.7	216.4	210.0	254.0	215.6	269.3	1.0	0.8	0.7	0.8
Iron	210.5	211.5	219.7	21.4	241.3	218.2	1.1	7.0	0.9	1.0
Copper	217.9	215.2	210.5	21.1	110.8	213.7	0.8	0.4	0.7	0.6

Conclusion

The heat conduction has been calculated which aluminum has a heat conduction of 317.18 kJ/mol and 493 kJ/g and ethanol has heat conduction of 55.7 kJ/mol and 17.22 kJ/g, and propyl alcohol has heat conduction of 813.2 kJ/mol and 14.42 kJ/g. These values are different from the literature values due to many systematic and random errors.

Heat of combustion of Alkanol

Table

Substance	Initial Temp °C	Final Temp °C	Change in ΔH °C	Initial Mass (g)	Final Mass (g)	ΔMass (g)	ΔMass (g)
	T ₁ T ₂ T ₃	T ₁ T ₂ T ₃	T ₁ T ₂ T ₃	T ₁ T ₂ T ₃	T ₁ T ₂ T ₃	T ₁ T ₂ T ₃	T ₁ T ₂ T ₃
Methanol	24 24 23	44 52 47	20 28 24	169.10 254.00 293.30	168.50 292.00 292.00	0.60 1.60 1.30	1.17
Ethanol	26 24 18	44 47 46	18 23 28	191.45 258.50 271.70	191.00 258.10 270.60	0.45 0.90 1.10	1.0
Prop-3-ol	23 25 24	41 47 39	18 23 15	141.10 254.00 139.10	140.55 253.20 138.70	0.55 0.80 0.40	0.58

Calculations

Methanol → $Q_{H_2O} = 100g \times 4.18 J g^{-1} K^{-1} \times 24K$

$= 10032 J = 10 kJ$

$n(CH_3OH) = \frac{1.17}{12+4+16} mol$

$= 0.03656 mol$

Molar heat = $\frac{Q}{n}$

$= \frac{10}{0.03656}$

$= 273.5 kJ/mol$

$= 37.68\% \text{ loss}$

Mass heat = $8752 kJ/g$

Mass of water = $100g$

Ethanol → $Q_{H_2O} = 100g \times 4.18 J g^{-1} K^{-1} \times 23K$

$= 9614 J = 9.6 kJ$

$n(C_2H_5OH) = \frac{1}{12+6+16} mol$

$= \frac{1}{45} mol$

Molar heat = $\frac{Q}{n}$

$= \frac{9.6}{\frac{1}{45}}$

$= 432 kJ/mol$

Mass heat = $19440 kJ/g$

Prop-3-ol → $Q_{H_2O} = 100g \times 4.18 J g^{-1} K^{-1} \times 15K$

$= 7804.5 J = 7.8 kJ$

$n(C_3H_7OH) = \frac{0.58}{12+6+16} mol$

$= \frac{0.58}{3000} mol$

Molar heat = $\frac{Q}{n}$

$= \frac{7.8}{\frac{0.58}{3000}}$

$= 806.90 kJ/mol$

Mass heat = 806.90×60

$= 48414 kJ/g$

Expected Value = $2010 kJ/mol$

Actual Value = $806.90 kJ/mol$

$= 40.14\% \text{ loss}$

m. h. n. c.

Alcohol Mass and Water Temperature

Fuel	Mass of Fuel (g)			Change in Mass			Temperature of Water (C)			Change in Temp		
	Before	After					Before	After				
	T ₁	T ₂	T ₃	T ₁	T ₂	T ₃	T ₁	T ₂	T ₃	T ₁	T ₂	T ₃
Methanol	2704	1024	1024	2700	1024	1024	0.4	0.5	0.3	0.4	23	24
Ethanol	1542	1754	1754	1027	1753	1752	0.5	0.4	0.3	0.4	24	24
2-Propanol	2714	1657	1657	2718	1657	1655	0.1	0.2	0.1	0.1	23	24

Constants:
 - 100 g water used all 4 tests
 - Each test applied for 2 min

HEAT OF COMBUSTION

CAM CLARKE

ALKANOL	TRIAL	MASS OF WATER (g)	MASS OF BURNER BEFORE (g)	MASS OF BURNER AFTER (g)	MASS OF FUEL BURNT (g)	INITIAL TEMP (°C)	FINAL TEMP (°C)	CHANGE IN TEMP ΔT (°C)	AVERAGE TEMP CHANGE ΔT_{av} (°C)
ETHANOL	1	50	279.3	277.9	1.4	23	72	49	47
	2	50	280.8	280.2	0.6	25	70	45	
	3	50	280.2	279.3	0.9	25	73	48	
METHANOL	1	50	277.2	275.7	1.5	21	71	50	42
	2	50	265.1	264.3	0.8	25	61	36	
	3	50	264.3	263.4	0.9	25	65	40	
PROPAN-2-OL	1	50	281.5	281.0	0.5	24	56	32	36
	2	50	281.0	280.2	0.8	24	64	40	
	3	50	280.2	279.6	0.6	25	60	35	